

tempts on the part of such accumulations of polar air to reach the region of equatorial calms. He supposes, further, that the cyclones of the north Atlantic arise through the mixing of the cold and warm air masses along the margin of the polar cap (the so-called "polar front").

It is clear that a great simplifying theory such as this offers a basis for long-range forecasting of the weather in our latitudes. If we accept the theory, it is not difficult to see that the general character of the weather over long periods may follow changes in the extent and shape of the region of cold sea, for the polar caps must, in the long run, coincide with the regions of coldest water. For example, the presence of a tongue of warm water projecting into Arctic regions, such as the so-called Gulf stream of the north Atlantic, will push this boundary back toward the pole, and cause contrasts such as are offered in winter by the cold climate of Labrador and the relatively mild climate of Iceland.

We may consider now whether the past severe winter can not be connected with some modification of the normal temperature of the seas within the area of exceptional cold. The immediate cause of the severe weather has clearly been the presistence of northerly and easterly winds over Russia and central Europe circulating round an "anticyclone" or region of high barometer over Scandinavia and Finland; which anticyclone has generally been separated from the area of high pressure that normally covers Siberia in winter by a region of relatively low pressure over Russia. Now Professor Witting found in the Baltic in the summer of 1927 a layer of cold water at a depth of about 10 fathoms, beneath the very warm surface water, heated by the sun, having altogether a volume much greater than that of a whole normal year's outflow from the Baltic into the North Sea, and having a temperature about 10° F. lower than the average. The surface waters of the Baltic are derived ultimately from the mixing of the river water with that finally ascending from such deeper layers, and this cold water might well chill their surface water, and the air in contact with them, for two years or more, in accordance with the time that the water might be expected to take in passing away along the Norwegian coast. Such chilling would cause the anticyclones which are so apt to form over Scandinavia to be more than usually persistent, as has been the case this winter. In this way the action of the cold water, which is far too small to produce directly a degree of cold such as has been observed, may do so indirectly through the agency of the wind, and the resulting accu-

mulations of ice and snow will carry the process still further.

It seems clear that if the action of a single sea such as the Baltic can be so great, there is a great field open for international cooperation in the systematic study of the physical states not only of the Baltic but also of all the seas and oceans in and around Europe, including the Caspian and the Black Sea. This should be done once a year, if not twice, and the results should be published quickly, so as to be available for long-period weather forecasting. This was in fact the policy of the International Council for the Exploration of the Sea before the war. It is hoped that the remarks that I have made will show that permanently to abandon such a scheme may be to throw away the opportunities of saving millions of pounds that would be afforded by the prediction, in good time, of winters such as that of 1928-29.

*June lake levels.*—According to a report of the United States lake survey the lake levels for the current June are higher than a year ago by the following amounts:

Superior, 0.26 foot higher than in June 1928.

Huron, Mich., 2.08 feet higher than in June 1928.

Erie, 1.88 feet higher than in June 1928.

Ontario, 1.87 feet higher than in June 1928.

*Meteorological summary for Chile, May, 1929 (by J. Bustos Navarrete, Observatorio del Salto, Santiago, Chile.)*—The rainy season began in central Chile in this month, but precipitation was not frequent. The Pacific atmospheric circulation was particularly active in the first and third decades.

The important anticyclonic centers that were accompanied by fine, cold weather were charted as follows: 5th to 6th, moving from central Chile toward Argentina; 9th to 12th and 14th to 19th, passing from Chiloe to the northern part of Argentina, and 25th to 30th, forming over the Juan Fernandez Islands, recurving toward the south near Chiloe, and later passing over Cordoba.

There were three important depressions attended by unsettled weather, wind, and rain during the periods 3d to 5th, 6th to 8th, and 23d to 25th. The first of these brought the first rain of the season in the central region on the 4th, the second crossed the extreme southern (austral) region, and the third caused general rains in the southern and central regions and snows on the cordilleras.

Monthly totals of precipitation were as follows: Region of Santiago about 2.40 inches, region of Concepcion about 6.70 inches, and region of Valdivia between 6.70 and 9.40 inches.—*Translated by W. W. R.*